

ABSTRACT OF THE DISCLOSURE

There is provided a semiconductor device having, on a silicon substrate, a gate insulating film and a gate electrode in this order; wherein the gate insulating film comprises a nitrogen containing high-dielectric-constant insulating film which has a structure in which nitrogen is introduced into metal oxide or metal silicate; and the nitrogen concentration in the nitrogen containing high-dielectric-constant insulating film has a distribution in the direction of the film thickness; and a position at which the nitrogen concentration in the nitrogen containing high-dielectric-constant insulating film reaches the maximum in the direction of the film thickness is present in a region at a distance from the silicon substrate. A manufacturing method of a semiconductor device comprising the step of making the introduction of nitrogen by irradiating the high-dielectric-constant insulating film which is made of metal oxide or metal silicate, with a nitrogen containing plasma, is also provided. This improves the thermal stability of the high-dielectric-constant insulating film, suppresses the dopant penetration and, in addition, prevents electric characteristics of the interface with the silicon substrate from deteriorating.